## Remarks

Claims 2, 4 and 6 are pending herein. Claims 3-6 have been withdrawn as being directed to a non-elected invention.

In the Office Action, claim 2 is rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,506,822 to Ichiroku et al. ("Ichiroku") in view of U.S. Patent No. 6,310,120 to Shiobara et al. ("Shiobara '120") and U.S. Patent No. 5,362,775 to Shintai et al. ("Shintai").

In view of the remarks herein, Applicant respectfully requests reconsideration and withdrawal of the rejection set forth in the Office Action.

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Applicant respectfully submits that claim 2 would not have been obvious over Ichiroku in view of Shiobara '120 and Shintai.

Instant claim 2 is directed to an epoxy resin composition for encapsulation of semiconductors which comprises (A) a spherical alumina, (B) an ultrafine silica having a specific surface area of 120-280 $m^2/g$, (C) a silicone compound, (D) an epoxy resin, (E) a phenolic resin curing agent, and (F) a curing accelerator. The ultrafine silica is contained in an amount of 0.2-0.8% by weight based on the total weight of the resin composition. The silicone compound (C) is a polyorganosiloxane and is present in an amount of from 0.3 to 2.0% by weight based on the total weight of the resin composition. The spherical alumina is present in an amount of 85-92% by weight based on the total weight of the resin composition.

The epoxy resin composition of Applicant's claimed invention has excellent properties for area mounting type semiconductor apparatuses, such properties including, e.g., excellent moldability, low molding shrinkage, high resistance to temperature cycle, high soldering crack resistance, and high thermal conductivity (see, e.g., page 4, lines 19-27 of the instant specification).

One of the components of Applicant's claimed composition is ultrafine silica having a specific surface area of 120-280 $m^2/g$. The Office Action cites Ichiroku for its teaching at col. 9, lines 59-64 of an admixture of alumina and fused silica. However, Ichiroku does not teach the

particle size of the fused silica. Thus, Ichiroku does not teach an ultrafine silica having a specific surface area of 120-280 $m^2/g$.

Ichiroku discloses finely divided silica having a BET surface area of at least 100 $m^2/g$. However, in Ichiroku, this finely divided silica is mixed with a hydrophobic organopolysiloxane to form an oil compound, and further mixed with a hydrophilic polyoxyalkylene-modified silicone oil and a polyoxyalkylene polymer to form a foam-suppressing composition. Thus, in Ichiroku's final product, the silica does not act as proper ultrafine silica. Therefore, for at least this reason, Applicant submits that Ichiroku does not disclose ultrafine silica having a specific surface area of 120-280 $m^2/g$.

Shintai also fails to disclose or suggest ultrafine silica having a specific surface area of 120-280 $m^2/g$ and, therefore, does not cure Ichiroku's failure to teach this component of Applicant's claimed invention.

Applicant further submits that even if it were obvious in view of Shintai to use 85-92% by weight of spherical alumina in Ichiroku, the result would not be Applicant's claimed epoxy resin composition because the silica in Ichiroku is not in the form of ultrafine silica having a specific surface area of 120-280 $m^2/g$.

At page 6, line 28 to page 7, line 17, the instant specification describes the unexpected superiority of using a combination of spherical alumina and ultrafine silica having a specific surface area of 120-280 $m^2/g$:

> When only the spherical alumina is used, flash characteristics during molding are inferior to cause the problem of leakage of the flash onto the substrate in molding of the area mounting type semiconductor apparatus, but when the ultrafine silica is added, the flash characteristics can be considerably improved. The specific surface area of the ultrafine silica is 120-280 $m^2/g$, and if it is less than the lower limit, long flashes are produced to deteriorate the flash characteristics, and if it exceeds the upper limit, the composition increases in viscosity to deteriorate flowability. Furthermore, the amount of the ultrafine silica in the whole resin composition is 0.2-0.8% by weight, and if the amount is less than the lower limit, long flashes are produced to deteriorate the flash characteristics, and if it exceeds the upper limit, the composition increases in viscosity to deteriorate flowability.

The unexpected superiority of using a combination of spherical alumina and ultrafine silica having a specific surface area of 120-280 $m^2/g$ can also be seen by comparing the results of Examples 2 and 4 and Comparative Examples 3 and 4 set forth in the instant specification. The formulations and properties of the invention examples are shown in Table 1 (page 15), and the formulations and properties of the comparative examples are shown in Table 2 (page 16). All four compositions contained the same type of alumina. The only difference between the compositions was the surface area of the ultrafine silica used therein, as indicated below:

Example 2: Ultrafine silica 1 – specific surface area of 180 $m^2/g$

Example 4: Ultrafine silica 2 – specific surface area of 240 $m^2/g$

Comp. Ex. 3: Ultrafine silica 3 – specific surface area of 100 $m^2/g$

Comp. Ex. 4: Ultrafine silica 4 – specific surface area of 340 $m^2/g$

Thus, Examples 2 and 4 used ultrafine silica having a specific surface area within the range recited in claim 2, whereas Comparative Examples 3 and 4 used ultrafine silica having specific surface areas outside the range set forth in claim 2. The composition of Comparative Example 3, which used an ultrafine silica having a specific surface area below the range set forth in claim 2, had inferior flash characteristics compared to the other compositions. The spiral flow properties of the composition of Comparative Example 4, which used an ultrafine silica having a specific surface area above the range set forth in claim 2, were inferior to those of the other compositions. The compositions of Examples 2 and 4, which used ultrafine silica having specific surface areas within the range of instant claim 2, had excellent flash characteristcs and thermal conductivity, little warpage and excellent temperature cycle properties.

Applicant respectfully submits that the results shown in Tables 1 and 2 in the instant specification represent unexpected results in view of the teachings of Ichiroku, Shiobara '120 and Shintai.

According to the Office Action, the Declaration Under 37 CFR §1.132 filed on February 26, 2007, was inconclusive because:

> any differences in the tested properties could also be a function of the widely divergent contents of o-cresol novolak epoxy resin and phenolic novolak resin employed in Examples 1-5 as reported in Table 1 on page 3. The amounts of o-cresol novolak epoxy resin and phenolic novolak resin have not been held constant to isolate the effect of the proportions of spherical alumina on the tested properties. Any results pertaining to a coefficient of thermal expansion and heat conduction are not unexpected since they are acknowledged in Shintai et al.

Applicant submits herewith a supplemental Declaration Under 37 CFR §1.132 ("the Declaration"), which describes five additional experiments (Examples 6-10) carried out relative to the claimed invention, wherein the respective amounts of o-cresol novolak epoxy resin and phenolic novolak resin were kept at constant values.

The formulations for Examples 6-10 are set forth in Table II of the Declaration. The formulations differed from one another only in the amount of spherical alumina 1 used therein. Each formulation used the same ultrafine silica, i.e., ultrafine silica 1, having a specific surface area of 180 $m^2/g$.

Instant claim 2 recites an amount of spherical alumina of 85-92% by weight based on the total weight of the resin composition. Only the Example 6 formulation set forth in the Declaration contained an amount of spherical alumina (90.0%) within the range set forth in claim 2. The formulations of Examples 7 and 9 used significantly lower amounts (i.e., 61.5% and 45.7%, respectively), whereas the formulations of Examples 8 and 9 used greater amounts (i.e., 101.0% and 190.0%, respectively).

The Example 6 formulation exhibited good properties in each of the measured categories, i.e., spiral flow, thermal conductivity, warpage of package, length of flash, temperature cycle properties, and solder resistance. On the other hand, the other formulations were good in some of the categories and inferior in other categories, i.e., none of the other formulations were as good as the Example 6 formulation in all categories.

As stated in the Declaration, the results presented in Table II show that the use of the spherical alumina in an amount within the range set forth in claim 2 is critical with respect to the thermal conductivity, warpage of package, length of flash, temperature cycle property, and

soldering resistance properties of the composition, even when the amounts of the o-cresol novolak epoxy resin and the phenolic novolak resin are kept at constant values.

Applicant respectfully submits that the superior results shown in Table II would have been unexpected in view of the prior art cited in the Office Action.

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In view of the remarks above and the Declaration submitted herewith, Applicant respectfully submits that claim 2 would not have been obvious over Ichiroku in view of Shiobara '120 and Shintai. Accordingly, Applicant respectfully requests that the rejection set forth in the Office Action be withdrawn and that claim 2 be allowed.

If any additional fees are due in connection with the filing of this paper, such as fees under 37 C.F.R. §§1.16 or 1.17, please charge the fees to Deposit Account 02-4300; Order No. 033036M073.

Respectfully submitted,

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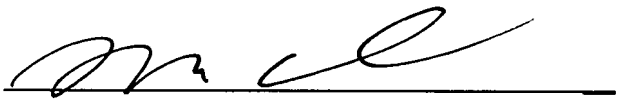

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MAM/MM/cj

Enclosures: (1) Petition for Extension of Time
(2) Check for the Sum of $120
(3) Declaration Under 37 CFR §1.132